GrummanWorld

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Grumman Wins Major C-17 Subcontract Job

Company awarded $28 million by McDonnell Douglas to develop flight control surfaces for new C-17 transport

The Aerostructures Division won a full-scale engineering development contract for composite flight control surfaces for McDonnell Douglas Corporation's new C-17 transport. This contract is worth about $28 million.

"The production phase of this contract has potential value to Grumman of about $300 million," says Grumman Chairman Jack Bierwirth. "The C-17 will be an excellent plane. Our strong experience in composite structures has been an important part of Grumman's recent technoiogical development, so we are especially pleased to be involved in this part of the McDonnell Douglas C-17 team."

"This contract — Aerostructures first with McDonnell Douglas — involves work on the only heavy lift aircraft planned for the foreseeable future. It also gives us potential for advanced composites production work that will take us into the '90s," adds Tom McGrath, Grumman vice president for Subcontracts and Modifications. "By demonstrating the same level of quality and cost control as on our Boeing subcontract programs, we will establish the same reputation with McDonnell Douglas."

Current Air Force plans call for the acquisition of 210 C-17s. The huge C-17 is designed to carry troops or offsized payloads, such as helicopters and tanks, long distances and land on small, battle-area runways. The plane will go into service with the Air Force Military Airlift Command in 1992.

After Aerostructures received the contract, a 14-member Grumman design team went to Long Beach, California, to work with McDonnell Douglas' C-17 designers. The team will be there until the preliminary design review, about three months from now.

The McDonnell Douglas and Grumman team will finalize the design of each of the graphite/epoxy pieces that make up a shipset: the left and right ailerons, the inboard and outboard elevators and the forward and aft, upper and lower rudders.

These are big units. For example, the ailerons are 21 feet long and the outboard elevators are 20 feet long. Their size will make them the largest composite components manufactured in Aircraft Systems' Milledgeville, Georgia, facility, where most of the parts will be made. About 25 percent of the detail composite parts will be produced by the Brunswick Corporation's Defense Division in Marion, Virginia. Grummanites at Glen Arm, Maryland, will make many of the machined parts.

Airborne! *The McDonnell Douglas C-17 transport will be able to carry up to 172,000 pounds of cargo to airfields near battle zones. The new U.S. Air Force transport will feature weight-saving, Grumman-built advanced composite flight control surfaces on the wings and vertical and horizontal tails.*

Current final assembly plans will affect Stuart, and St. Augustine, Florida.

Under the development contract, Grumman will build two shipsets of control surfaces. One set will be used on the first test aircraft, while the other will be used on non-flying, full-scale structural test aircraft and for other testing.

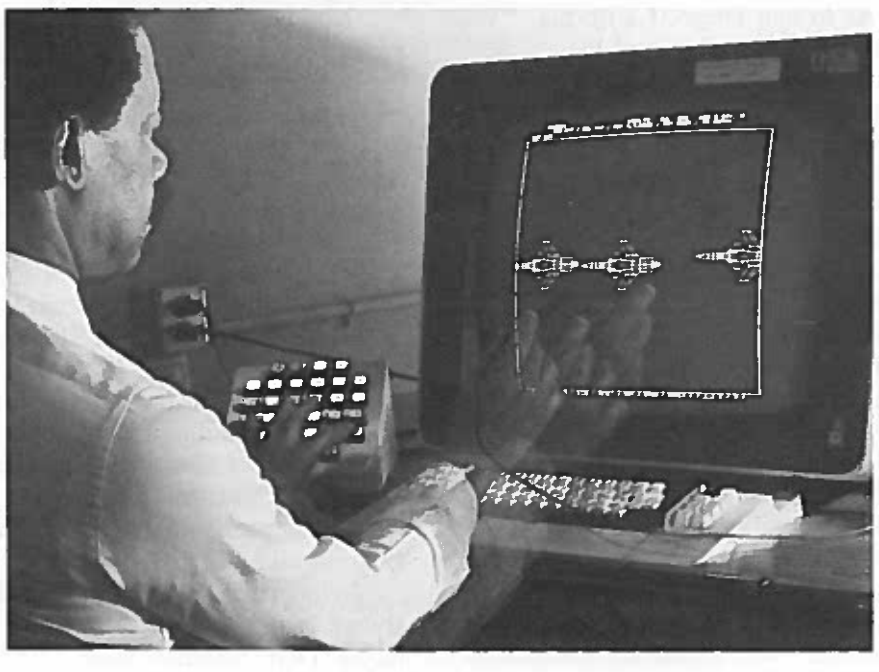
Grumman will deliver the first test article shipset in mid-1989. First flight of the C-17 will be in 1990, the year Grumman begins production deliveries.

At peak periods, about 65 design engineers in Melville and another 40 or so Manufacturing personnel in tool fabrication in Bethpage will be on the project.

To win this contract, Aerostructures applied some of the concepts used on its all-composite empennage for the V-22 Osprey. The empennage is the aft end of this all-composite, tilt-rotor aircraft now under development by a Bell/Boeing team.

Moreover, Grumman had to guarantee to meet or beat weight targets for each finished component.

"The C-17 control surfaces are very complex with their graphite internal ribs and supports and graphite skins," says program manager Nick Corvelli. "There are also significant design loads that we have to handle, and stringent reliability and maintainability requirements."■



Picture This. *'Faster, cleaner, more efficient' is the way computer graphic illustrator Ken Smith compares technical illustration on a computer to working on a drawing board. A member of the Publications department in Building 15 in Bethpage, Smith is preparing an electrical connector crimping tool drawing for an EA-6B project. He takes the information he needs from blueprints in the Grumman Engineering and Manufacturing System data base and files the info in the Publications data base, retrieving it as he needs it. (Photo by Bob Settles)*

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Sole Master Craftsmanship Award Goes To Milledgeville

MILLEDGEVILLE, Georgia — For the Grummanites here, it was lonely at the top in 1986. But they weren't complaining.

Milledgeville Operations was the only site in the Master Craftsmanship program to cut its rework rate more than its 1986 goal. Grummanites here make composite parts for Grumman and subcontract programs. Aircraft System's Machining Operations, Bethpage, Calverton, and Stuart facilities, and Electronics Systems' Great River Operations participate in the program, but only Milledgeville won a monetary award.

For their team effort, Grummanites at Milledgeville received over $53,000 from the Master Craftsmanship program. That translated into $87 after-tax dollars for each member of the 1986 Milledgeville team.

"You have been awarded for your quality in workmanship," said Tom Lahey, vice president-Milledgeville Operations, at the March 13 awards ceremony. "You've achieved the best performance in low rework rates in the company; you are building the components right the first time."

"Congratulations to all of you. You not only achieved your Master Craftsmanship goals for 1986, but you exceeded them by a considerable margin," said Everett Bennett, director of Quality Operations, which administers the Master Craftsmanship program. "In recent years, Milledgeville has been honored for outstanding participation in the Project Sterling program, and now you have set the standard for excellence in the Master Craftsmanship program."

The Master Craftsmanship program is one of self-improvement. Grummanites try to work more carefully than they did the previous year and cut the number of parts that have to be fixed.

Each participating group gets a rework goal at the start of each year. The goal is easy to figure. First, each group's best three months for rework are averaged. Then the rework average for the whole year is figured. Halfway between those two numbers is the goal.

If the center does better than its goal, the members share 25 percent of the savings. This year some 6,000 Grummanites are participating in the program.■

De-Duction. *In Building 2, Bethpage, Mary Mulvihill hooks an F-14 duct up to an air hose to check a weld for leaks. Aircraft Systems' Tank and Duct Department makes ducts for all Grumman aircraft. The ducts range from a foot to about 10 feet in length, and are used in a plane's fuel and environmental systems. (Photo by Bob Settles)*

Retirees

On behalf of our fellow workers, *Grumman World* salutes the following Grummanites for their contributions to the company and wishes them well in their retirement. Those who have recently retired are:

Frederick V. Housley (9), Edward Volkommer (30), Joseph Andria (3), William B. Atchison Jr. (2), Walter J. Andersen (2), Frances T. Lyons (35), John McKinnell (2), Enrico Massi (3), Jack B. Nielsen (30), Ronald W. Boyce (2), Francis A. Damis (4), William Jamieson (25), Walter A. Jasuta (2), Alice M. Kumer (35), Minnie Linado (30), Edmund J. Marmurowski (30), Charles Miller (30), Lucy Napolitano (3) Alfonse F. Pristupa (30), Robert G. Rouse Jr. (30), Michael A. Strazay Sr. (30), August F. Cassella (18), Alfred E. Fischer (111), Eugene Albertson (77), Charles Anderson (1), Joseph Bascone Jr. (5), Sidney Berman (30), John Czarniecki (24), Leonard C. Farber (1), Chester Greenberg (17), Vincent Iannacone (30), Robert W. Ballin (5), Bernard G. Distler (30), Dario Antonucci (39), John L. Apelskog Jr. (43), Robert F. Doolin (30), William F. Fink Jr. (GTSI), Joseph Gervasio (12), Evelyn Finan (110), George P. Dietz (6), Claire Hetterich (106), William J. Blyman (5), Richard E. DelGiorno (18), Joseph P. Walker (380), Charles W. Schnath (9), Thomas B. Bond (9), Edward J. Summers (15), John Caserta (77), Mae L. Gill (55), Joseph J. Feeney (110), William A. Heuslein (3), Robert L. Upper (30) Leonard Benedetti (12), Lawrence Colapietro (4), Elizabeth B. Hannigan (2), Robert E. Olson (17), Domenic J. DeMarco (30), James Seto (5), Charles E. Harman (56), Edward B. Mann (9), John W. McDonald (106), Ruth D. McDonald (106).

Cost Conscious Business Travel Rewards Lucky Grummanites With Pleasure Trips

Grummanite John Hines has big plans for his cruise this spring: he and his fiancee will be married by the ship's captain.

Hines was the 1986 grand prize winner in Grumman's Travel Reservation Incentive Program (TRIP), which awards free trips to cost-conscious business travellers. Hines, a structural mechanic for E-2C Hawkeyes at the Norfolk, Virginia, Naval Air Station, plans to take his week-long Caribbean cruise in early May.

Grummanites who save on airfare get a chance to win trips like Hines'. There are monthly, quarterly, and annual prize drawings, as well as a yearly non-traveller prize. The grand finale occurs right before Christmas; most of those big prize winners are just now taking their free trips.

Hines' cost-saving business trip was to San Diego, California. "We go out there a lot, and the administrator usually tries to get the best airfare for us," he says. "Every company should have something like this: it's a great incentive. As an EIP member, I want to see the company save money. In the long run, by helping Grumman save, I'm helping myself."

Hines has done a fair amount of travelling in his 14 years as a Grummanite. He has worked in Patuxent River, Maryland; Building 4 in Bethpage; Little Rock, Arkansas; Lantana, Florida; and now Norfolk, and each assignment required occasional business trips.

A business trip to California also proved lucrative to John Neville, who works for Electronics Systems in Melville, Long Island. Neville, a corporate estimator for Test Equipment Products, won the quarterly prize — a week in Paradise Island, Bahamas.

Neville spent a week in California as part of a proposal project. By staying through the following weekend, he qualified for a low-cost, super-saver ticket — and eight chances for the monthly and quarterly TRIP drawings (the traveller gets one chance for each $100 saved, or the portion thereof). When a discount ticket requires a Saturday night stayover, Grumman will pay the employee's expenses — provided they do not exceed the savings in airfare.

With today's widely divergent plane-ticket prices, getting the best deal requires savvy on a traveller's part. "It's ironic, but some other Grummanites flew with me and paid full fare because they didn't want to spend the weekend in California," Neville notes. "Not only did I save on airfare — I was able to stop and see somebody. You really have to know a little bit, and make sure you ask the right questions, when you're dealing with air travel."

Non-travellers also win a yearly award. A computer program takes the perm numbers of all Grumman employees and separates out the business travellers. Among the non-travellers, one perm number is picked for a TRIP award. The non-traveller award for 1986 went to Hugh Grandison, a welder for Propulsion Testing in Building 2, Bethpage. His prize: a week for two in Puerto Rico.

"Being a non-traveller, I never paid much attention to this program," says Grandison, who has worked at Grumman for 31 years. "I think it's great. I've never won anything like this before."

Winners' accommodations are always in top-notch hotels. Other recent TRIP travellers have included: December prizewinner Alex Superina of Building 1, Bethpage, who received a weekend trip to Orlando, Florida; October prizewinner Lois Nelson of Building 2, who received a weekend in Los Angeles; and fall quarterly winner Dr. Robert Melnick of Building 35, Bethpage, who received a week in Aruba.

The program is open to all Grumman sites and divisions; your local Grumman-approved travel agency must work with Grumman's Travel Operations department. If you'd like more information on the program, call Janet Fiore, Travel administrator, at Ext. (111) 58612, (516) 575-8612.■

The Price Is Right

Need some office furniture for your home? Property Disposition in Bethpage sells excess desks, chairs and the like.

To make a purchase, get an employee sales request card from your local Employee Services representative, fill it out and mail it to A04-17.

When Property Distribution collects enough items for a sale, you will be notified. On sale day just show up and pick the items you want. A file cabinet, for example, could go for $10 to $25, depending on its size and condition. You must pay by check.

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An Interview With Allied President Ron Peterson

'We'll Be Making Some Decisions Soon That Will Have A Strong, Positive Impact On Our Truck Business'

Recently, Grumman World *talked to Allied President Ron Peterson as part of its continuing series of interviews with top company officials.*

The Allied Division is headquartered in Bohemia, Long Island. The 2,000 Grummanites in this division build boats, emergency vehicles and truck bodies at plants in eight states.

Grumman World: *How did Allied do in 1986? What does this year look like?*

Ron Peterson: In 1986, sales were $160 million. This year sales should reach $250 million; in '88 we project over $350 million in sales. Most of the increase is attributed to the Long Life Vehicle for the U.S. Postal Service. Our goal is to be a half-billion dollar division by 1992.

GW: *The LLV win put Allied in high gear, didn't it?*

RP: 1986 was the highest sales year in our history. Because we won the LLV contract last year, it was the first time that Allied ever had contracts with a backlog of any significance. Our basic truck business is a 60 or 90 day backlog. The LLV has allowed us to plan the job differently, to do things differently, to tool differently. It's allowed us to do some innovative things. Olson Trucks is going very well. Our major customers are coming through. It looks like '87 will be as good as '86, if not better.

The new Grumman Boats plant we are opening in Minong, Wisconsin, is going to help us break into that market significantly. We're looking at probably a 20 percent increase in sales this year. Certainly next year sales will be even better.

GW: *Are any new boats planned?*

RP: We're coming out with a longer, good-looking new aluminum boat this year for the bigger lakes. We're at a sensitive stage of our design and marketing efforts right now so I can't say more about the boat — but we have high hopes for it.

GW: *Do the projections for aluminum boat sales look good?*

RP: Oh yes, especially now. The pontoon boats have done very well. They've significantly increased our market and the lake boats we'll unveil in June should also significantly increase our market. By establishing regional satellite assembly plants we are picking up market places that were almost closed to us before because of shipping costs.

We'll see more of these satellite assembly plants in the future. What we've learned from the LLV job in terms of manufacturing and material handling techniques we hope to apply to all our other product lines. We're beginning to look at Allied as a company rather than as individual units. The difficulty in that is when you've got to assemble in five different plants, tooling has to be done at a much higher level than it has in the past. We'll be making some decisions soon that will have a strong, positive impact on our truck business.

GW: *Will there be a commercial version of the LLV?*

RP: Unless we are overlooking something significant, I expect production of a commercial LLV to begin in 1988. We've built two prototypes of commercial LLVs on chassis made by Isuzu. At the same time, we have an outside firm doing a market survey to learn what the size of the market is.

In June we will build six more of these vehicles and loan them to six of our key customers in different markets. They will have them for three to six months for evaluation.

If it's a go, we'll begin discussing how this vehicle would also be assembled in Japan by Isuzu.

GW: *Does this vehicle fit into the same market niche as the Kubvan that Allied tried to sell a couple of years ago?*

RP: It's the same size market but it's basically a different product.

We had a lot of problems with our Kubvan. We were trying to build the whole vehicle and we are just a body builder. We did meet some market resistance at the time, and our distribution wasn't adequate. When you're distributing a vehicle and you're not tied into an automotive manufacturer that has the distribution chain you're at a real disadvantage. The commercial LLV will be sold through our regular channels plus Isuzu dealers.

GW: *Will it be built on the same production line as LLV?*

RP: No. The Post Office facility is totally dedicated to that product. The color of every LLV is the same; the line is automated for that particular model. Once we get into a commercial version we will offer some options, like paint schemes, so we can't build them in that facility.

GW: *Have you picked a site?*

RP: Not yet, we're still looking. It depends on where we find the market and where the chassis are coming into the country.

GW: *Didn't Olson put a new product on the streets?*

RP: We've introduced another product this past year that's really picking up a tremendous part of the market for us. That's the Van-Body. Right now they are selling ahead of our expectations. They're allowing us to get into the lower cost niche of the market, which is very large, and we hope to make a significant penetration there.

'What we've learned from the LLV job in terms of manufacturing and material handling we hope to apply to all our other product lines'

GW: *How does Olson rank in truck sales?*

RP: In terms of aluminum walk-ins we're number one. In terms of van types we're probably number four. We have about 60 percent of the aluminum walk-in truck business.

GW: *Allied's LLV division will be responsible for much of the truck body sales growth. Do you see any significant sales increase for Olson Trucks?*

RP: When you've got the kind of market share Olson has you're not going to add a heck of a lot more growth unless you add new product. That's what we're looking at now. We're doing studies. For example, should we be going into big trailer trucks? However, we've got to get our productivity up to maximize our profits as well as look at new markets.

GW: *How is Emergency Products doing?*

RP: Last year we had some problems. We had to recall our Aerialcat ladder platform trucks and modify some structural elements. Design flaws had been discovered in testing and analysis of the newer mid-mount platform. Modifications were completed by yearend but new product development was delayed.

But the recall did us some good. We identified and fixed the problem before any damage was done. Customers said that was an unusual response, and they realized our dedication to the safety of the firefighter and the integrity of our product. That kind of perception will serve us well in a competitive market. Our improved mid-mount aerial platform and new straight stick, a standard telescoping ladder, should be coming on line this year. They should give us a substantial share of the aerial market. We are now number one in aerial platform sales and have an excellent reputation for stability and quality.

GW: *Is that market flat?*

RP: It's very flat. That's one of the problems with it, and there are so many manufacturers in it. I think the total market is something like 3,500 trucks a year, period. And you've got something like 100 manufacturers.

GW: *What do Grumman Emergency products cost?*

RP: The average aerial is probably around $380,000. Most of our pumpers are close to $150,000. The smaller size pumpers are $50-60,000. But the bulk of our dollar sales are the bigger ticket items.

GW: *How do sales look for Emergency Products for the next couple of years?*

RP: We see a fairly steady increase, mainly because of new products we're adding in the aerial line. In the international market, there have been ups and downs. One of the problems we've had in this market is the effect of economic conditions on our co-producer in Indonesia. We have a licensing agreement with P.T. Amalgam in Jakarta. They build our trucks there but, with the drop in oil prices, that economy slowed considerably. The market in the People's Republic of China is huge. It's too early to tell how the situation will develop in China. International is trying to work out a co-production agreement there. On the other hand, we just got some finished trucks ready for ARAMCO, the Arabian American Oil Company. But the way we see it, anything we get internationally is like icing on the cake.

GW: *You've gotten a lot of visibility from the LLV.*

RP: Certainly! A billion dollars can do a lot for you! It's not even a year ago that we signed the contract. Now we've got the LLV design ready for production and a lot of the Montgomery factory has been rebuilt. While we were doing that we moved our existing Olson truck production over to Montoursville so we didn't have to lay off our work force.

That was important to us. The eight months that the factory was being built we were able to keep those people working. Our experienced workers are critical to the success of the LLV program and we couldn't afford to lose them. They will be the backbone of the program because, when LLV is in full production, there will be two and a half new people to every one of our veterans.

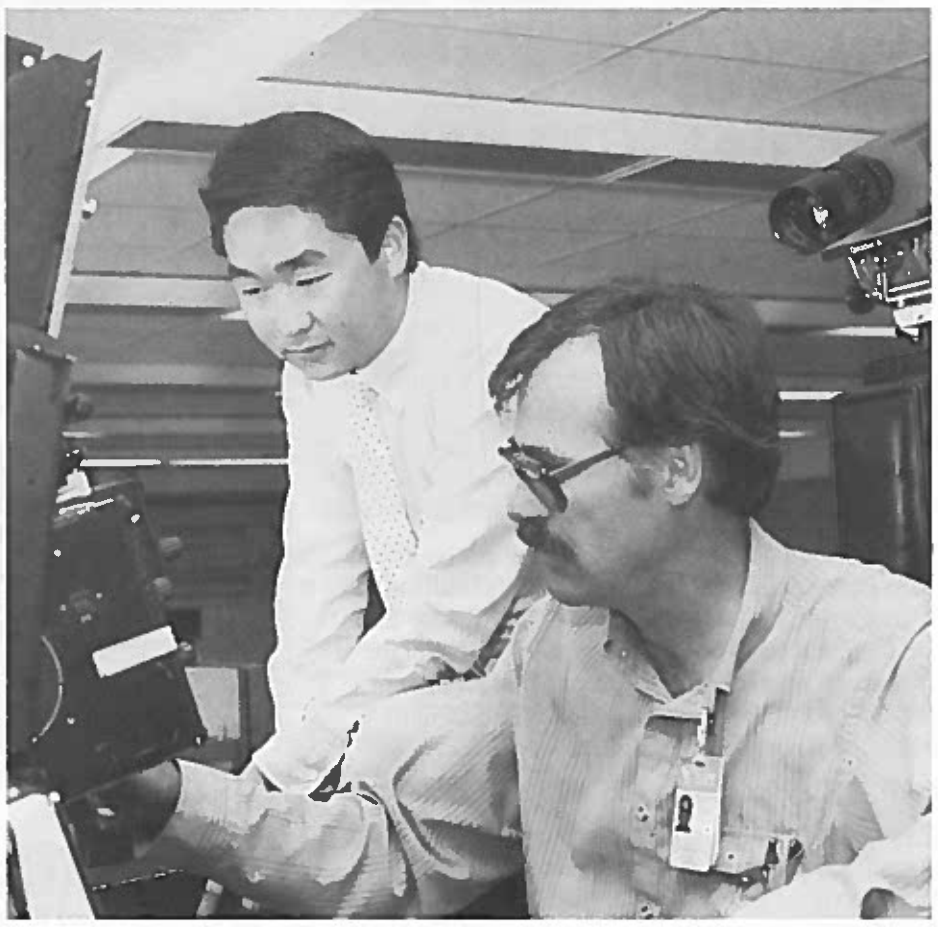
GW: *Have there been times during the LLV building program that you thought it wouldn't meet the schedule?*

RP: As the problems get solved, you begin to see that you're going to make it. Critical to us last week: we dropped the first body on the first chassis and it fit like a glove. The people working on this project are doing a marvelous job. The growth of Allied depends on a top quality LLV rolling off the lines at Montgomery. Everybody there knows it and they are committed to making it a great success.■

Inner Workings. *With the Pacific shore as a backdrop (top photo), Jim O'Brien adjusts a component of the F-14A systems integration test station. The station can be extended out the doorway in a combat simulation. Dennis Thompson (above, kneeling) and Jerry Pratt install parts in an F-14 forward section, which become the new F-14D test station.*

New F-14D Test Station Wi

California team refurbishes F-14 forward section fo



POINT MUGU, California — In the F-14 Weapons Systems Support Lab here, a dozen engineers and computer people are testing a new software program for the Tomcat. Headsets are donned, and the flight crew climbs into the F-14 cockpit that functions as a systems integration test station.

In a scene reminiscent of an amusement park, the cockpit is suspended out an open doorway on telescoping metal rails. The cockpit remains above the rocks and breakers of the Pacific Ocean for the four-hour test series.

The Navy currently has two of these unusual test stands at Point Mugu, which support today's F-14A and F-14A+ aircraft. A group of Grummanites here is building a third for the next generation Tomcat, the F-14D. The test station is being made from an F-14 nose, gleaned from the Bethpage, Long Island, salvage yard, and will be complete in 1989. The Grummanites will install all of the same equipment that will be in the F-14D.

The Weapons Systems Support Lab is where new systems for the Tomcat prove their mettle. "Flight is simulated in the systems integration test stations, in as realistic an environment as possible," says Jim O'Brien, shift leader of the lab facility. "More aircraft performance points may be checked this way, and it saves on expensive flight time."

The lab building is perched right on the shoreline. It looks out on the Navy's Pacific missile test range, which extends over 1,000 miles out from Point Mugu.

In a test, the appropriate test station can remain inside the lab, getting simulated target information from the laboratory's mainframe computers. Or, it can be extended out the door while a real target airplane is flown over the range. Back in the laboratory, teams monitor how the "aircraft" reacts to the target.

The latter setup more realistically simulates what the aircraft will encounter in its seagoing mission. The team can evaluate lifelike airborne scenarios, while still controlling the test conditions in the lab environment. Suspending the test station over the Pacific surf lets the test team determine if detrimental effects will occur, and fix them before a new system goes into fleet aircraft.

The F-14A test station arrived with the first Grummanites in 1969, when the first software for the original Tomcat was being tried out. The Navy liked the arrangement so much, it asked them to stay on for good, and Grumman's presence grew over the years.

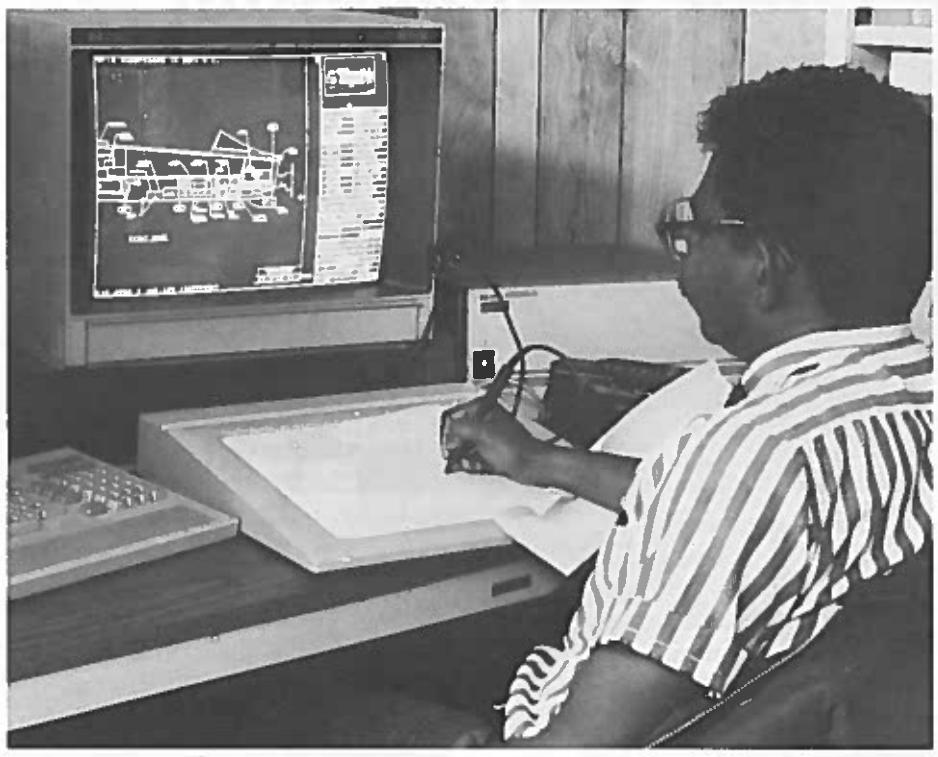
Theirs has been an ongoing task: the Navy makes hundreds of requests for changes in the course of just a year. Essentially, the Navy tells Grumman of a new capability it would like a fleet aircraft to have, to keep pace with the ever-mounting enemy threat. The systems integration test station is an invaluable tool in developing systems to meet that need.

Suspending the station over the surf lets the test team determine if detrimental effects will occur.

"In the '70s, software upgrades became a way for the Navy to maintain a technological edge at an affordable price," says Alan Stewart, F-14 Point Mugu program manager. "New defense funding was limited at the time. Software adds new

l Get A Surfside Workout

simulations in unusual waterview laboratory



Video View. *At left, Stan Imanishi (standing) and Dan Hartman check the fighter-to-fighter data link on the F-14A test station. The camera in the background helps document simulation exercises. Above, Darryl Anderson draws a schematic of the in-board profile of the F-14D test station. He's using a Hewlett-Packard computer-aided design and drafting system.*

Simulator's Skeleton. *The test station is being made from an F-14 nose shipped from the Bethpage, L.I., salvage yard. At top, Bob Killian wires the test station's cockpit, while above, Joe Sokol solders a connector.*

capabilities, yet is much cheaper than new hardware. It's a philosophy the Navy has held to."

The test stations were crucial in developing an advanced in-flight training program and the fighter-to-fighter data link. The data link lets Tomcat pilots compare information on possible targets, and also warn each other of potential threats. "Their next assignment will be evaluating the new Infrared Search and Track system," says Stewart.

Much of the F-14D's electronics will have embedded software, which permanently resides in a system.

The lab has full data acquisition and videotaping capability. Recording events this way saves on the painstaking notes that would normally have to document a test series.

Eventually, an addition to the lab building will house the new F-14D test station, and the Navy and Grumman people who will work on the F-14D program. The test station will also be used by other defense contractors through leasing agreements. Hughes Aircraft, for example, plans to use it for systems development of the AN/APG radar that will be aboard the F-14D.

O'Brien points out that the F-14D systems integration test station will be vital to the F-14D, since this aircraft will use much more software than its predecessors. Much of the electronic equipment will have *embedded* software, which permanently resides within a system. Getting such software systems to work in concert is a complicated engineering task.

"The new Tomcat will have new avionics, an electronic countermeasures suite, new navigation systems, programmable displays," says O'Brien. "It's Grumman's job to put it all together and make it work.

"When I went to work 28 years ago, we installed hardware, hooked it together, and turned it on," he continues. "There was no such thing as software. Now, the software tells the hardware what to do."

The lab recently began a $1 million modernization to meet the requirements of the F-14D design and to take advantage of today's smaller, yet more powerful, computer systems. The lab recently converted from a hybrid analog/digital computer simulation system to an all-digital system. The extra floor space will be taken up by two Digital Equipment VAX 8600 computers, which will run F-14D simulation and real-time data acquisition software.

The new F-14D test station will by no means relegate the original test stations to a storage closet. For a few years, most of the F-14s in the fleet will still be the "A" and "A+" versions. The test stations must be kept on-line to enable Grumman to respond to software change requests for fleet aircraft.

Grummanites at Point Mugu have recently taken on several other F-14D projects. "The work includes systems engineering and software integration, and life-cycle planning," says Rick Riccardone, Engineering manager. "This is at the Navy's request. Normally, we develop systems for aircraft already in the fleet."

'In the '70s, software upgrades enabled the Navy to maintain a technological edge.'

Systems engineering is the discipline that ties together all the complex systems that make up a modern aircraft. Systems engineers also ensure a new system won't alter the myriad of delicate systems already in the plane.

One of the site's main duties has always been to measure and improve the performance of aircraft armament. This project is no exception. The F-14D will be outfitted with all the missiles found on the current "A" version, plus the AMRAAM, HARM and Harpoon missiles.

The Point Mugu team is now doing error analysis of missile software. Error factors are tiny, almost nonexistent, but they exist in every software system. By running exhaustive simulations, the Point Mugu engineers are determining when errors might occur, if error factors multiply when systems are used together, and ways to improve the software.

You might think this type of analysis would require a lot of computing power, but the team at Point Mugu uses IBM Personal Computers. The PCs also run math models of the navigational and air-to-air scenarios.

The life-cycle planning project is funded separately by the Pacific Missile Test Center. Grumman will forecast the software support the F-14D will require when it joins the fleet in 1990.

The goal: always to keep this 'cat ahead of the pack.■

Gifted Dozen Go To Head Of Class In '87 Grumman Scholarship Competition

Top 12 high school scholars win $24,000 tuition grants, remaining 12 finalists win $4,000

All it takes is one year's tuition bill to wipe out all those savings bonds your child has been getting from Aunt Sara, Uncle Harry, and other relatives.

According to the American Council on Education, the average undergraduate paid nearly $5,300 to attend a state university during the 1985-86 academic year — a whopping $10,426 to attend a private institution.

College education is exceedingly expensive, but a dozen Long Island high school seniors are getting a break. They have been selected 1987 Grumman Science and Engineering Scholarship recipients.

Over 210 Long Island high school seniors and Grumman dependents across the country competed. That field was narrowed down to 24 finalists: a dozen Grummanites and the remainder students in the open competition.

The top 12 finalists will receive four years of tuition assistance, up to $6,000 per year, and summer employment at Grumman. As in recent years, half of the scholarships were won by sons and daughters of Grummanites.

Since the company began its scholarship program in 1944, over 500 L.I. students and dependents have received tuition grants, totalling over $3 million.

For the first time in Grumman scholarship history, the remaining 12 finalists in the competition will receive awards of up to $1,000 each for four years, plus summer employment with the company. In this group, half were Grumman dependents. Should a full scholarship student drop out of the program, a finalist would be upgraded to a scholar and receive the remainder of the vacated four-year monetary scholarship.

The Grumman dependents who won scholarships are: Anthony Antonucci, Naomi Botkin, Peter Dutton, Patricia Hartung, Colleen McCarty, and Alan Kuhn.

Winners of scholarships in the open competition are: Katherine Lee, Alexander Ogilvie, Kristan Rausch, Edward Rusowicz, John Titterton, and Jackie Weiner.

Two of this year's scholarship winners have siblings who won Grumman scholarships in 1985. Colleen McCarty's brother Matthew is attending the Massachusetts Institute of Technology; Alan Kuhn's brother Phil also goes to M.I.T. on a Grumman scholarship.

Another first in this year's competition: the grandson of a retired Grumman senior vice president — George Titterton — won a Grumman scholarship. John Titterton, valedictorian of the senior class at Cold Spring Harbor High School, won in the open competition. In addition, the scholar's father John is a math teacher at Syosset High School; he wrote a glowing recommendation for another of this year's scholarship winners: Jackie Weiner.

All of the finalists are ranked in the top one percent of their high school classes; a vast majority are enrolled in advanced placement courses.

As part of the scholarship competition, they were required to take three College Entrance Examinations Board achievement tests — English composition, mathematics and a choice of physics or chemistry — in January of this year. Final selection was based on SAT and CEEB scores, the students' class rank and other criteria.

Six children of Grummanites won scholarships.

Anthony P. Antonucci is the son of Anthony Antonucci, manager of Financial Analysis in the Corporate Services Division. Young Anthony is the valedictorian at John F. Kennedy High School in Plainview. He plans to major in computer science.

"My father sparked my interest in computers about seven years ago," says Anthony. "Although I was thoroughly frustrated at first, I soon started to enjoy programming."

Anthony went on to ace three advanced computer courses in high school.

The younger Antonucci has represented his school on the varsity tennis courts for four years. A writer for his school paper, he is also a member of the National Honor Society and the Mathletes.

Naomi Botkin is the daughter of Eli Botkin, an engineering group leader for Aircraft Systems. She is the valedictorian at Huntington High School. Naomi plans to study computer science in college.

"Naomi consistently chooses high caliber and advanced placement courses, challenging herself academically and pushing herself to excel," writes her guidance counselor.

Music is a very important part of Naomi's life. She has been a member of the All-County Band since ninth grade and was selected for the All-State Orchestra this year.

A member of the National Honor Society, Naomi is also involved in mathletes, Students Against Drunk Driving and student government.

Peter Dutton Jr. is the son of Peter Dutton Sr., assistant to the director of Flight Sciences for Aircraft Systems. Young Peter is ranked fourth in his class of 228 at Westhampton Beach High School. He will study mechanical engineering in college.

"I chose mechanical engineering because it is a discipline involved in many engineering activities," says Peter. He adds that his father got him interested in pursuing an engineering career.

President of the National Honor Society at his school, Peter has played saxophone in the band since his freshman year and was a member of the varsity track team for three years. He is treasurer of the student council.

Patricia Hartung is the daughter of John Hartung, a technical advisor in Operations Analysis for the Aircraft Systems Division. She is ranked in the top one percent of her class of 523 at Smithtown High School East in St. James. Patricia plans to study physics in college.

"Physics is an area with many options, and more will be appearing in the future. I want to be part of that future," says Patricia.

With a full schedule of advanced placement courses, she has still found time to write a student column in the local paper, be co-captain on the math team, and serve on the student council. Patricia is also a member of the National Honor Society.

Colleen McCarty is the second child of Joseph McCarty, a senior specificiations engineer in Aircraft Systems, to win a Grumman scholarship. Her brother Matthew won in 1985 and is attending Massachusetts Institute of Technology. Ranked second in her class of 172 seniors at Rocky Point High School, Colleen plans to major in aerospace or mechanical engineering in college. "Colleen's ability to formulate succinct equations from word problems and apply mathematics to problems is the most adept I have ever encountered," writes her advanced chemistry teacher.

A member of the National Honor Society, she is an officer in the computer club, editor of the school paper and a member of the Thespian Society.

Alan Kuhn is the son of Alfred Kuhn, an Aircraft Systems engineering manager. His brother Phil won a 1985 Grumman Scholarship and is studying at Massachusetts Institute of Technology. Alan is salutatorian at Oyster Bay High School. He plans to study engineering in college.

"Of the many students I have taught over the years, I would place Alan in the top 10," wrote the chairman of the mathematics department at his high school.

Alan has played on the varsity soccer team for four years and on the varsity fencing team for three years. A member of the National Honor Society, he is also editor of the school paper, captain of the math team and an award-winning trumpet player.

There were six scholarship winners in the open competition.

Katherine Lee will graduate third in her class this June from New Hyde Park Memorial High School.

She plans to major in electrical/electronics engineering in college. A member of the National Honor Society, she is an editor of the yearbook and a member of the Spanish club.

Alexander Ogilvie will study electrical engineering. He will be the salutatorian at his graduation at Stony Brook School.

A member of the varsity track and basketball teams, Alex writes for the school paper and has been a tutor for the past three years.

Kristan Rausch of Sewanhaka High School in Floral Park ranks fifth in his class of 372 students. He plans to study electrical engineering in college.

A varsity soccer player, Kristan is an Eagle Scout in the Boy Scouts of America. He is a member of the National Honor Society and Mathematical Honor Society.

Edward Rusowicz of Copiague will graduate this June from St. Anthony's High School in South Huntington. Ranked in the top three percent of his senior class, Edward plans to major in electrical engineering in college.

A member of the National Honor Society, he plays in the school band and orchestra.

John Titterton is the valedictorian at Cold Spring Harbor High School.

He plans to study engineering in college. A three-letter varsity man, John plays soccer, basketball and lacrosse. A member of the National Honor Society, he also plays the trumpet in the school concert and jazz bands.

Jackie Weiner of Syosset High School is ranked fifth in his class of 500. He plans to major in mechanical or aerospace engineering in college. A member of the National Honor Society, Jackie plays in the school band and belongs to the Latin club. He is also a member of the Mathlete team.

Six dependents won $1,000 a year in tuition assistance.

Ross Bracco is the son of Rosario Bracco, a senior propulsion flight test engineer for Aircraft Systems. He will graduate from Hauppauge High School this June and plans to study electrical engineering.

Mona Farkas is the daughter of Milton Farkas, an Aircraft Systems engineer in Building 2. She plans to study applied math/computer science after graduating from Yeshivah of Flatbush-Joel Braverman High School.

Barry Hemmerdinger is the son of Louis Hemmerdinger, a Space Systems program manager in Building 25. Barry will graduate from John F. Kennedy High School in Plainview; he plans to study engineering in college.

Douglas Parker is the son of Gordon Parker, a manager in Space Systems, Building 25. Douglas is a senior at West Islip High School and plans to major in electrical/computer engineering.

Michael Pasyanos is the son of Emmanuel Pasyanos, an Aircraft Systems engineer in Building 35. Michael will graduate from Bethpage High School this June and study physics in college.

Steven Taub is the son of Paul Taub, an engineering analyst in Data Systems. He will study civil engineering upon graduation from Hauppauge High School this June.

The six other finalists are: **Dara Blitz** of Lawrence High School in Cedarhurst; **Gary Chmiel** of Miller Place High School; **Kelly Lysaght** of Walt Whitman High School in Huntington Station; **Robert Miller** of Uniondale High School; **Joseph Sanchez** of Miller Place High School; and **William Van Nostrand** of Connetquot High School in Bohemia.■

Budding Astronauts. *These three youngsters at the U.S. Space Camp are using actual astronaut training devices to simulate building a space structure. This space walk simulator is one of several pieces of such equipment used by young campers during the six-day program.*

Grumman Dependents Get 20% Off At Space Camp

Is your kid a space enthusiast? A 20 percent discount is being offered to children of Grumman employees to attend the NASA Space Camp and Space Academy in Huntsville, Alabama.

Over 3,000 youngsters went to Space Camp and Space Academy last year. Space Camp is for grades 5, 6, and 7, while Space Academy is for grades 8, 9, and 10. Both are six days long, with sessions from the spring through the end of August. Space Camp begins every Monday in the spring, and every Monday and Friday starting June 5. Space Academy sessions begin on Mondays and Fridays.

The nonprofit camp/academy is adjacent to NASA's Marshall Space Flight Center. Campers attend lectures on a wide variety of topics related to space. They participate in simulation and training exercises similar to the astronauts', including mock Space Shuttle missions, and work on individual science projects. They are housed in a dormitory built to resemble a space station.

Children of Grummanites may register for any session for which there is an opening. Call (800) 6330-7280, toll free, to obtain application forms. Fees are normally $425 to $525, depending on age. To get the discount, a statement on Grumman letterhead, indicating the parent works for Grumman, must be submitted with the application.

The discount applies to any individual claimed by the Grummanite as a dependent of the household. It is not available to non-dependent nieces, nephews, or other extended family members.

Personals

My family and I wish to thank all my co-workers for their kind expressions of sympathy and support during the recent loss of my brother. **Andrew Vinson**

We would like to express our sincere thanks and deep appreciation to all my friends and co-workers for their kind and thoughtful expressions of sympathy during the recent loss of our mother and father. **Walter French and Family**

My family and I wish to thank all my co-workers and ESO for the beautiful flowers and their kind expressions of sympathy during the recent loss of my brother. **Jo Bolton**

Our families wish to express our heartfelt thanks and appreciation to all of our co-workers and friends at Grumman and to ESO for their thoughtfulness and kind expressions of sympathy during the recent loss of our mother. **Trifon, Bessie, Josephine and Mark Prasinos**

My family and I wish to thank my co-workers, friends and ESO for their expressions of sympathy during the recent loss of my father. **Lester Elms**

My family and I wish to thank all my friends, co-workers and ESO for their kind expressions of sympathy and support during the recent loss of my father Warren. **Barbara Salina**

We would like to thank all of my co-workers and ESO for the beautiful flowers and their kind expressions of sympathy during our time of sorrow at the loss of our daughter Christine. **Frank Ambrosio**

Many thanks to all my friends and ESO for their thoughtfulness, get well wishes and prayers during my recent illness. **Lois Coffey**

My family and I wish to thank all my co-workers and ESO for the beautiful flowers and their kind expressions of sympathy during the recent loss of my brother. **Al and Joan Giardina**

My family and I wish to thank all my co-workers and ESO for their kind expressions of sympathy during the recent loss of my wife. **Artie Martin**

Obituaries

Stanley A. Angur of Operations Analysis, Bethpage, Aircraft Systems Division, died March 9 at the age of 63. He had been with the company since 1953 and resided at 10 Stowe Ave., Babylon, N.Y.

Ernest Baker Jr. of Hydraulics Subs., Calverton, Aircraft Systems Division, died March 13 at the age of 56. He had been with the company since 1962 and resided at 37 Lyman Ave., Patchogue, N.Y.

Quincey Bauer of Inspection Electronics, Great River, Electronics Systems Division, died March 13 at the age of 64. He had been with the company since 1951 and resided at 36 Penbrook Dr., Stony Brook, N.Y.

Retiree Obituaries

Byron E. Ames of 14312 Coronado Dr., Spring Hill, Florida, died February 23, 1987. He retired in 1978.

Walter P. Bock of 2073 SE Lafayette St., Stuart, Florida, died December 27, 1986. He retired in 1960.

Samuel D. Custis of 9C Martin Luther King Dr., Hempstead, N.Y., died February 14, 1987. He retired in 1973.

Welton Davenport of 41-14 Vernon Blvd., Long Island City, N.Y., died December 10, 1986. He retired in 1965.

Earl P. Dean of 75 Rose Ave., Hempstead, N.Y., died February 25, 1987. He retired in 1972.

Raymond Ellingsen of 516 Main St., Northport, N.Y., died February 26, 1987. He retired in 1981.

Chester R. Fitzgerald of 288 Raymond St., Rockville Centre, N.Y., died December 13, 1986. He retired in 1973.

Alois L. Gross of 40 Oxford Rd., Old Bethpage, N.Y., died January 7, 1987. He retired in 1984.

Anthony Nolis of 9 Roxbury La., Massapequa, N.Y., died February 10, 1987. He retired in 1977.

Raymond O'Donnell of 74 Braham Ave., Amityville, N.Y., died March 2, 1987. He retired in 1984.

William A. Opitz of 85 Elm La., Hampton Bays, N.Y., died February 26, 1987. He retired in 1975.

Alvie R. Pryor of 13108 Brandenburg Hollow Rd., Smithsburg, Maryland, died January 26, 1987. He retired in 1977.

John C. Scheulin of 111 Richard Ave., Merrick, N.Y., died March 4, 1987. He retired in 1970.

George Tate of 326 First Ave., St. Petersburg, Florida, died January 1, 1987. He retired in 1957.

Charles A. Andreshock of 149 Keswick Dr., East Islip, N.Y., died March 5, 1987. He retired in 1961.

Lawrence J. Bullis of 348 Oxford Dr., Savannah, Georgia, died March 12, 1987. He retired in 1985.

Joseph Feola of 7002 NW 97th Ave., Tamarac, Florida, died March 5, 1987. He retired in 1975.

Louis Freundlich of 17 Algiers St., Plainview, N.Y., died March 3, 1987. He retired in 1980.

Raymond S. Hubbs of 89 Clinton Ave., Huntington, N.Y., died March 4, 1987. He retired in 1965.

Edward T. Jacobs of 31 Lenore Ave., Hicksville, N.Y., died March 8, 1987. He retired in 1985.

Sophia Johnson of 2251 No. Fed Hwy, Ft. Pierce, Florida, died February 12, 1987. She retired in 1967.

Elmer M. Neibecker of 123 Buckeye Dr., Morton, Illinois, died March 2, 1987. He retired in 1979.

Joseph E. Oliver of 16 Hicks Cr., Hicksville, N.Y., died March 18, 1987. He retired in 1970.

Charles F. Riley of 3720 NE Linda Dr., Jensen Beach, Florida, died March 15, 1987. He retired in 1977.

Warren E. Schill of 149-19 33rd Ave., Flushing, N.Y., died February 18, 1987. He retired in 1974.

Samuel C. Sidman of 2750 NE 183rd St., North Miami Bch., Florida, died March 6, 1987. He retired in 1971.

Aasulv Sunde of Hidra Gate #10, Flekkejjord 4400, Norway, died October 13, 1986. He retired in 1971.

Where's My Grumman World?

As with any publication, distribution can be a problem and *Grumman World* is not immune to snarls in its distribution system.

The corporate newspaper is published twice a month on the second and fourth Fridays.

All Long Island sites receive the paper through the mail rooms on the day it's published. If your department is not receiving enough copies, contact your local mail room.

Grumman World is shipped via Parcel Post to all other Grumman locations. Normal delivery takes about two to three days. If your facility is not receiving enough copies or the delivery is late, please call Bernadette Gately, (516) 575-4334.

All retirees receive their papers via bulk-rate mail; it usually takes about 10 days for delivery. If you are a retiree who recently moved, please write to us and enclose your new and old addresses. Please include your new and old ZIP codes. Our address is *Grumman World*, A22-GHQ, Grumman Corporation, 1111 Stewart Avenue, Bethpage, N.Y. 11714. It usually takes six weeks to incorporate a change in the mailing list.

Let Us Know

We don't want to do all the talking.

We'd like to know what you think about the things you see in these pages, and what you see going on in the company. Serious comments, questions and complaints are welcomed, and will be answered by the people most qualified to respond.

We'll get back to you promptly with their replies. If the topic is of general interest, we'll print it.

Letters to the editor should be addressed to *Grumman World*, 1111 Stewart Avenue, A22-GHQ, Bethpage, N.Y. 11714, and should include your name and address. Letters may be edited for clarity or space.

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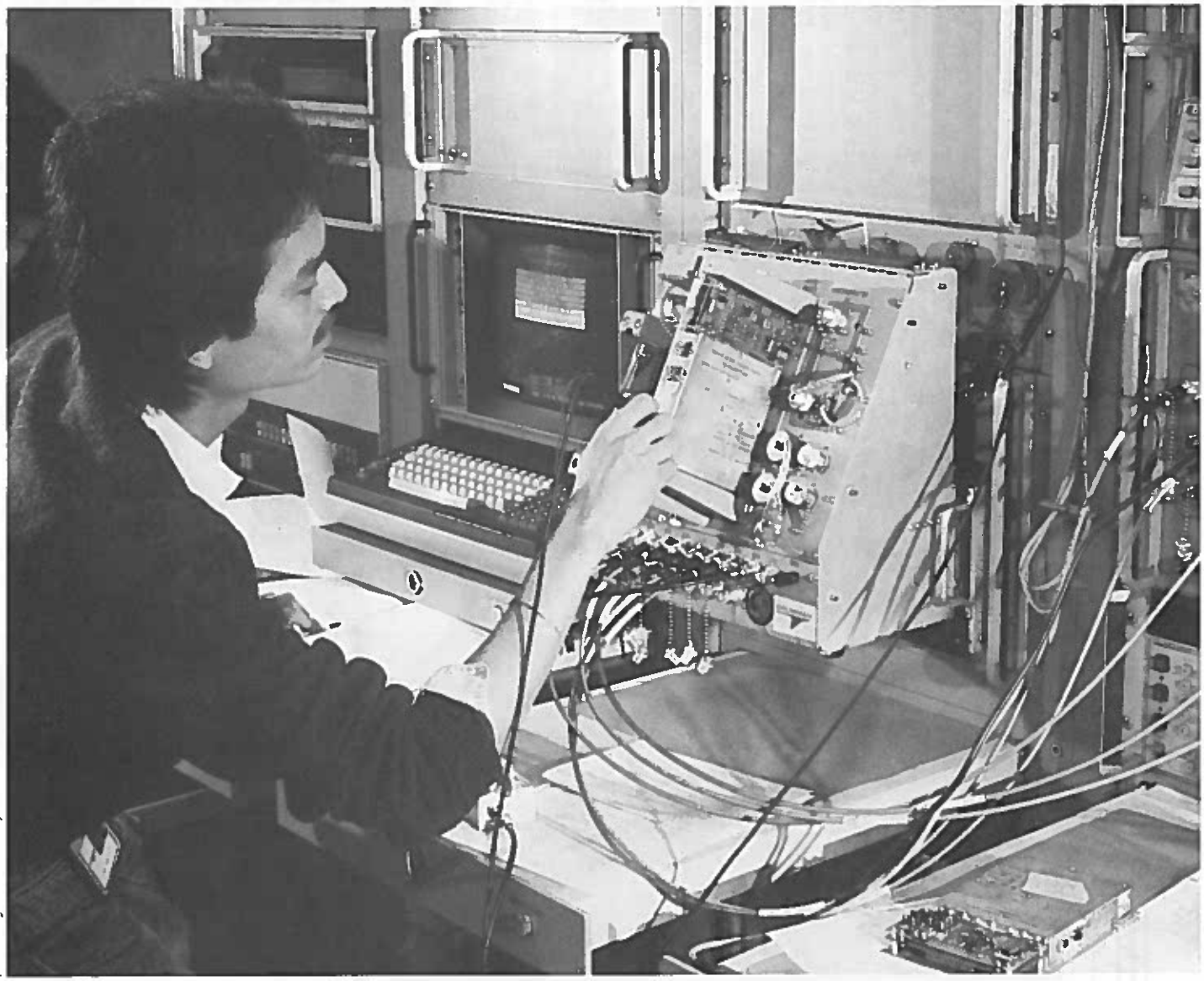

(Photo by Bob Settles)

Finding Fault

There's nothing wrong with this circuit card, but electrical engineer Chi Tse troubleshoots it anyway.

Tse is working on the radar/communications (RADCOM) test bench in Building 106, Melville, Long Island. He is creating a test program set for a circuit card found in the E-2C Hawkeye's radar amplifier/mixer.

A test program set is computer software that mates an automatic tester to individual electronic parts. When the software isolates a problem, the faulty part will be identified on the test bench's computer screen.

The Hawkeye is packed with electronic devices, each made up of many small parts. Thousands of test programs must be created in order for the customer to maintain the equipment. This particular test program is part of the support package for the Egyptian E-2C.

Tse also uses the RADCOM bench to write A-6 and EA-6B test program sets. When just one black box is replaced in any of Grumman's aircraft, new programs must be created to handle the new electronics.